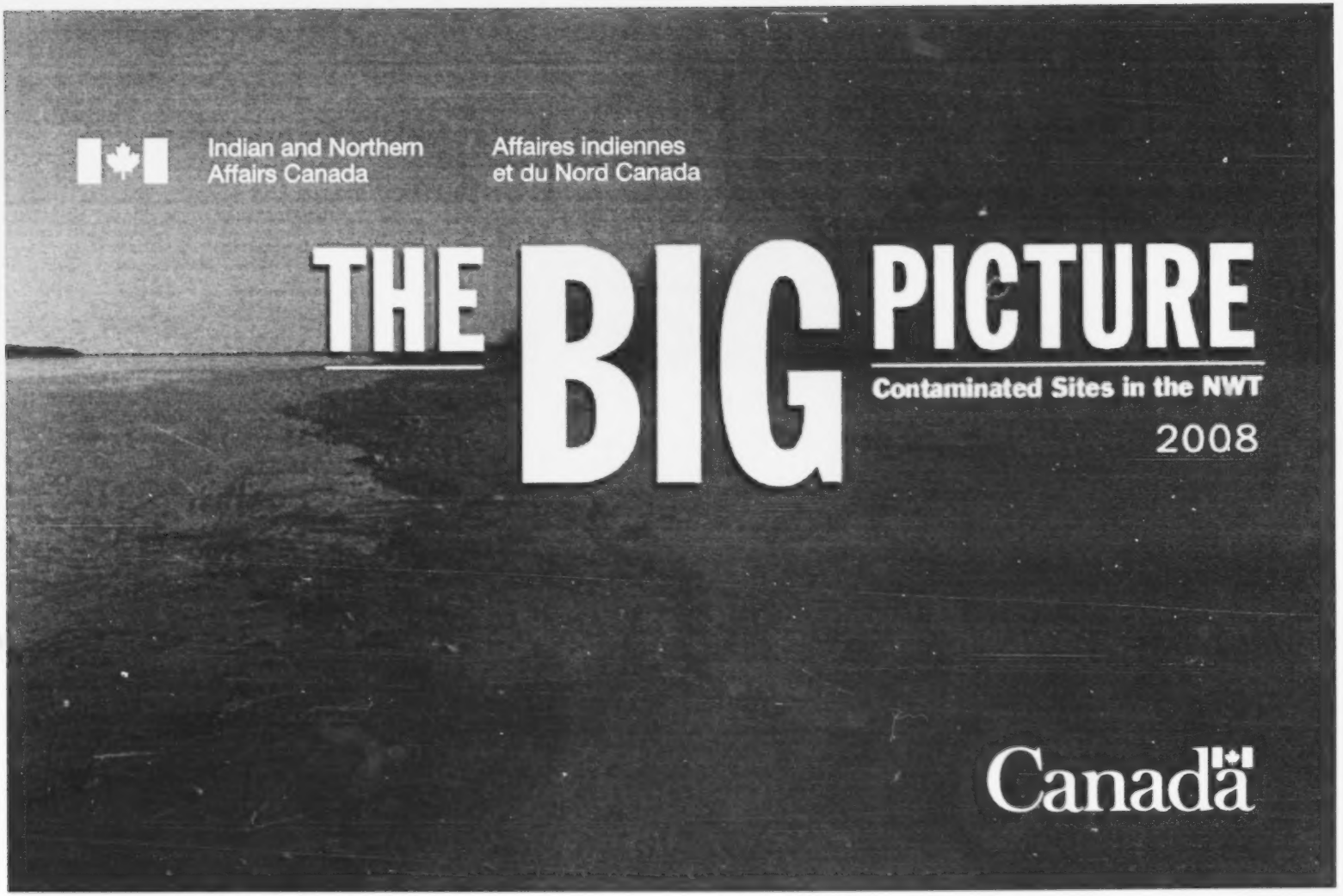
Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada
THE BIG PICTURE
Contaminated Sites in the NWT
2008
Canada

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Introduction

This booklet, *The Big Picture*, contains information related to contaminated sites in the Northwest Territories, and projects underway by Indian and Northern Affairs Canada (INAC) and their partners to remediate these sites.

You'll find information about the remediation process for contaminated sites, and descriptions of some contaminants and hazards commonly found there.

As well, The Big Picture contains summaries of current remediation activities occurring at the high priority sites, as well as information about the Federal Contaminated Sites Action Plan and doing business in the NWT for contaminated sites remediation.

Please check INAC's NWT Contaminants and Remediation website at http://nwt-tno.inac-ainc.gc.ca/cd_e.htm for the most up-to-date information on contaminated sites in the NWT.

INAC's Mandate

The Contaminants and Remediation Directorate (CARD) brings together all of the work done by Indian and Northern Affairs Canada (INAC) associated with federal contaminated sites in the NWT, and the Northern Contaminants Program.

The directorate is currently managing 21 contaminated sites in the NWT, at various stages of remediation. Many of these sites became the Government of Canada's responsibility after private owners relinquished their properties according to the legislation of the day, or when companies went bankrupt. The properties then reverted to the Crown, and as representative of the Crown, INAC became custodian of these properties and related remediation activities.

To guide its efforts, INAC created the Contaminated Sites Management Policy in 2002. To find out more about this policy, please visit the INAC website at http://www.ainc-inac.gc.ca/ps/nap/consit/manpol_e.html.

The department is committed to communicating with NWT residents regarding the remediation of contaminated sites, and providing economic opportunities for northerners wherever possible.

Protecting the North

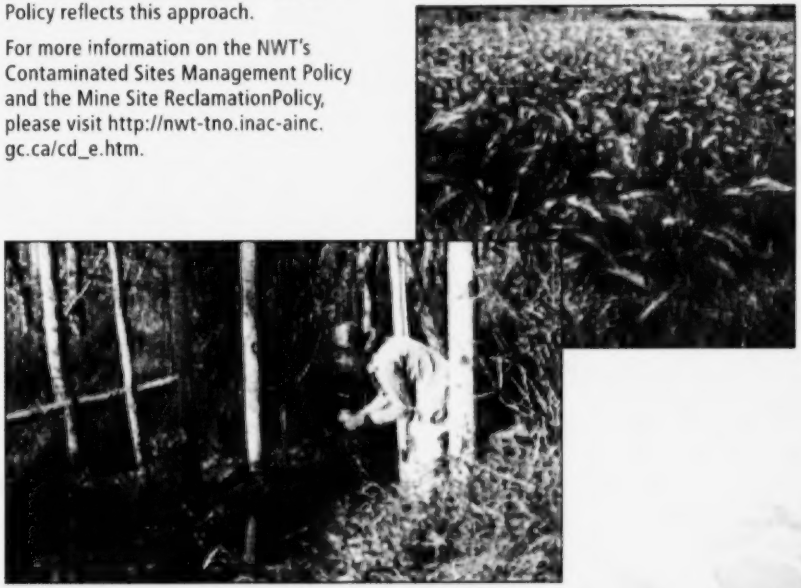
The Government of Canada recognizes that not only is it important to remediate federal contaminated sites, it is also necessary to prevent them from occurring in the future.

Today, there is a suite of legislation protecting the North. It includes the *NWT Waters Act, the Mackenzie Valley Resource Management Act* and the *Territorial Lands Regulations*. Pollution prevention and "polluter pays" are also two key elements underlying the principles of the Contaminated Sites Management Policy.

As well, because of the importance of mining to the NWT, INAC also instituted the Mine Site Reclamation Policy (MSRP) for the NWT, which reflects the Government of Canada's commitment to ensure that new mining operations do not leave a legacy of environmental and human health hazards or a financial liability for the Canadian taxpayer.

Technologies associated with mine site remediation are continually improving, as are mining practices. For example, most mining operations now incorporate progressive remediation. This is a "clean up as you go" approach, which has become a standard operating procedure for mining in the North. This efficient, effective approach is in everyone's best interests. The Mine Site Reclamation Policy reflects this approach.

For more information on the NWT's Contaminated Sites Management Policy and the Mine Site ReclamationPolicy, please visit http://nwt-tno.inac-ainc.gc.ca/cd_e.htm.



Federal Contaminated Sites Action Plan (FCSAP)

What is FCSAP?

The Federal Contaminated Sites Action Plan (FCSAP) is a cost-shared program that supports federal departments, agencies and consolidated Crown corporations in addressing contaminated sites for which they are responsible. The primary objective of this program is to address the risks that these sites pose to human health and the environment, and to reduce the associated financial liability.

The goal of the FCSAP is to complete, within 15 years, the assessment and remediation or risk management of highest-risk federal contaminated sites.

Who administers FCSAP?

FCSAP is administered jointly by Environment Canada, which houses the FCSAP Secretariat, and the Treasury Board Secretariat of Canada, which ensures consistency with Treasury Board policies on the management of federal real property.

What government departments are involved?

Indian and Northern Affairs Canada (INAC) and the Department of National Defence (DND) have responsibility for many of the most contaminated sites. These include military installations and other sites related to national defence activities on Federal Crown lands dating back over half a century, long before the environmental impacts of such activities were adequately understood or managed. INAC also inherited responsibility for many former mines in the North after they were abandoned, or through bankruptcy proceedings and court decisions.

Four federal government departments – Health Canada, Fisheries and Oceans Canada, Environment Canada, and Public Works and Government Services Canada – are responsible for providing expert support to custodians, the FCSAP Secretariat and the Federal Contaminated Sites Associate Deputy Minister Steering Committee.

What types of projects are eligible?

Three types of projects are eligible under FCSAP:

- **Assessment**, which involves a detailed analysis of the site to identify the nature and extent of the contamination
- **Immediate care and maintenance** to manage an imminent environmental threat
- **Remediation/risk management** actions, in which various alternatives for addressing contaminated sites are developed and reviewed before a final option is recommended to reduce the risk to human health and the environment

How many sites will FCSAP address?

FCSAP calls for the assessment and remediation or risk management of an estimated 6,000 federal contaminated sites over the next 15 years.

The Treasury Board of Canada maintains the Federal Contaminated Sites Inventory. The inventory includes all known contaminated sites for which federal departments and agencies are accountable. There are about 4,000 such sites in the inventory, from across Canada. More than a quarter of these are currently being remediated or under risk management. Close to 2,000 sites are still being assessed, and about 1,000 are considered remediated. To view the inventory, visit the Treasury Board Secretariat website at http://www.tbs-sct.gc.ca.

For more information on the Federal Contaminated Sites Action Plan, visit the Environment Canada website at http://www.ec.gc.ca/etad/csmwg/pub/taking_action/en/toc_e.html.

FCSAP 10-Step Process

In 1999, the Contaminated Sites Management Working Group (CSMWG) released the document *A Federal Approach to Contaminated Sites* outlining a ten step process for addressing a federal contaminated site. These guidelines were developed to ensure a common approach to the management of contaminated sites.

1
Identify possible sites
Identify potentially contaminated sites based on activities (past or current) on or near the site.

2
Perform historical review
Assemble and review all historical information pertaining to the site.

3
Perform initial testing
Determine a preliminary characterization of contamination and site conditions.

4
Classify site and assign priority
Classify contaminated site using the CCME National Classification System. Prioritize the site for future investigations and/or remediation/risk management actions.

5
Conduct detailed testing
Test specific areas of concern identified in Step 3 and conduct further in-depth investigations and analysis.

6
Reclassify site if necessary
Update the ranking based on the results of the detailed investigations, using CCME National Classification System.

7
Develop remediation/risk management plan
Develop a site-specific plan to address contamination issues.

8
Implement remediation/risk management plan
Implement the site-specific plan that addresses contamination issues.

9
Conduct confirmatory sampling
Verify and document the success of the remediation/ risk management strategy.

10
Conduct long-term monitoring
If required, ensure that remediation and long-term risk management goals are achieved.

Public Involvement

The Key to Successful Remediation Projects in the North

The Contaminants and Remediation Directorate believes that the key to a successful remediation project is the involvement of stakeholders – community members, governments, industry, the general public – in all stages of the remediation, where possible.

Public involvement is important because it:

- Builds trust amongst all parties
- Increases capacity of all parties by increasing knowledge and understanding
- Improves decision-making process
- Avoids conflicts by identifying and addressing critical stakeholders and issues early in the process
- Develops mutual understanding and improves relationships so that long-standing disagreements can be addressed
- Creates real and lasting change by designing and implementing a process that addresses community priorities in a meaningful way

For more information on public involvement best practices for the remediation of contaminated sites, please visit the Health Canada website at http://www.hc-sc.gc.ca/ewh-semt/contamsite/public_e.html.

Contaminated Sites in the NWT

Contaminated Sites

Sites in the Inuvialuit Settlement Region (ISR)

1. Atkinson Point Military Site
2. Kittigazuit Military Site
3. Johnson Point

Sites in the Sahtu Settlement Area

4. Contact Lake Mine
5. Port Radium Mine
6. Bonanza/El Bonanza Mines
7. Silver Bear Properties

Sites in the Wek'èezhii Region

8. Colomac Mine
9. Indore/Beaverlodge Mines
10. North Inca
11. Rayrock Mine

Sites in the Akaitcho Region

12. Giant Mine
13. Tundra Mine
14. Discovery Mine

Sites in the Dehcho Territory

15. Axe Point Military Site

Inuvialuit Settlement Region

Inuvialuit Settlement Region

In 1984 the Canadian Government reached a comprehensive Aboriginal land claim agreement with the Inuvialuit, called the Inuvialuit Final Agreement (IFA) through the passing of the *Western Arctic Claims Settlement Act*. The area covered by this agreement, known as the Inuvialuit Settlement Region (ISR), totals approximately 1,000,000 km^2 and is situated in the northwest corner of the Northwest Territories, Canada.

The ISR includes six communities: Paulatuk, Ulukhaktok (formerly Holman), Sachs Harbour, Tuktoyaktuk, Inuvik and Aklavik. The region is home to the Inuvialuit, who belong to three linguistic groups: Uummarmiut, Siglit and Kangiryuarmiut. Collectively, the three dialects are known as the Inuvialuktun language.

A number of contaminated sites have been identified and prioritized in the ISR region, and identification and assessment is ongoing.

Contaminated sites in the ISR identified for further investigation and potential remediation are located on both Inuvialuit and Crown Land.

Inuvialuit Settlement Region Sites

Assessment

Grand Roy Mines (mineral exploration site) & a few surrounding smaller sites

Remediation

Atkinson Point (BAR-D) DEW Line Site

Johnson Point Staging Facility

Monitoring

Horton River (BAR-E) Dew Line Site

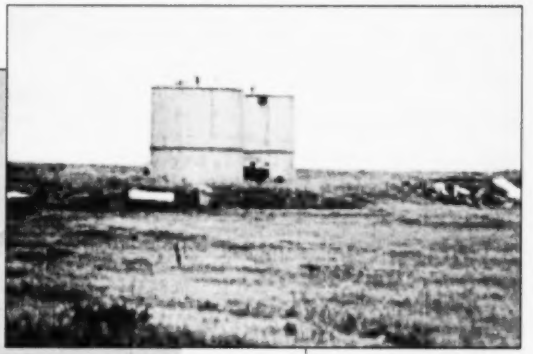
Remediation Completed

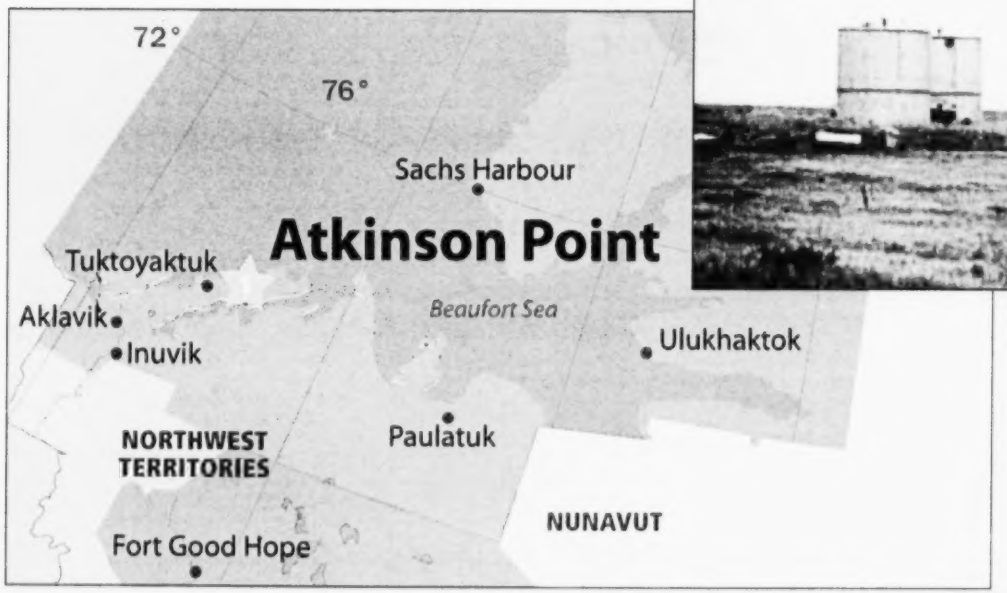
Kittigazuit / Yellow Beetle Military Site

Horton River (BAR-E) DEW Line Site

Pearce Point (PIN-A) DEW Line Site

Atkinson Point (BAR-D) DEW Line Site





Atkinson Point (BAR-D) DEW Line Site

Atkinson Point, otherwise known as BAR-D, was an Intermediate Distant Early Warning (DEW) Line site located approximately 80 km northeast of Tuktoyaktuk by McKinley Bay. This military radar site was constructed in 1957 and operated until 1963. The land reverted to INAC in 1965 and was made available for scientific use by government and university groups until 1981. Several surface dispositions – such as permits and leases – were issued in the area of the site, including the most recent to Canadian Reindeer Ltd.

What are the concerns at the site?

The site includes several sources of PCBs, heavy metals and soils containing hydrocarbons. Several landfills, barrels and fuel tanks, and buildings containing PCB-amended and/or lead-based paint and asbestos also remain on site.

Remediating the site

Some initial work was completed in 1993, in which most of the visible debris at Atkinson Point was consolidated.

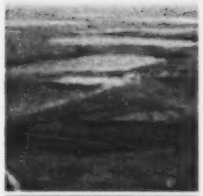
A detailed environmental site assessment was completed in 2005 with additional assessment work in 2006. A traditional knowledge survey and community and contractor site visits were also completed in 2006. A remedial action plan was developed in consultation with the Inuvialuit, with a resulting contract awarded in 2007 for site remediation work.

Future plans

Remediation work planned for 2007/2008 includes moving equipment and camp facilities to site, excavating inorganic soils and soils containing PCBs and preparing them for removal, excavating and remediating soils containing hydrocarbons, and collecting hazardous waste and preparing it for removal. As well, buildings will be demolished, and petroleum products will be incinerated onsite. Hazardous and non-hazardous waste will be transported for offsite disposal.

Kittigazuit Military Site

Kittigazuit Military Site



The Kittigazuit Military site, located near Kittigazuit Bay, between Inuvik and Tuktoyaktuk, was used as a long-range navigation site (LORAN) by the military. It was a significant LORAN site in the northern region, built in 1947 and operated from 1948 to 1950. The station was named "Yellow Beetle." After the LORAN project was shut down, the site was used as a waste metal depot by INAC.

What were the concerns at the site?

Through site assessment, it was determined there was DDT and metal contaminated soils, hydrocarbon contaminated soils and asbestos waste associated with the buildings. There was a lot of debris on site, including unidentified barrels, decaying buildings and equipment.

Remediating the site

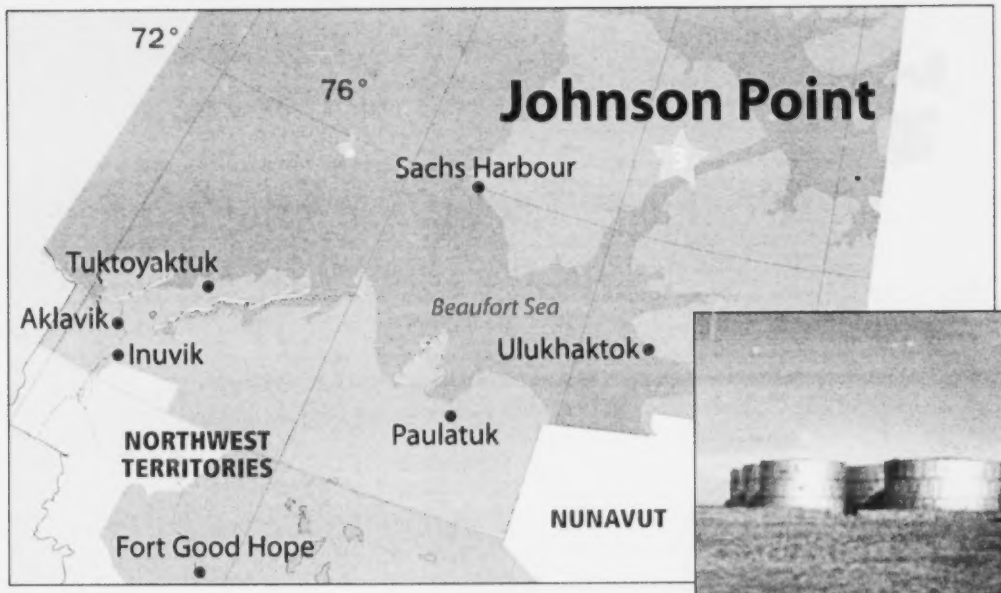
A large portion of the remediation was completed in late summer/fall of 2003 through a contribution agreement with Inuvialuit Projects Inc., a subsidiary of the Inuvialuit Development Corporation. The second phase of clean-up occurred in 2003/04, including a major hydrocarbon delineation program to determine the volume of hydrocarbon contaminated soil.

Last summer, activities focused on excavating hydrocarbon contaminated soil and placing it into sealed containers on site, and conducting a geophysical survey to confirm there are no other sources of contamination below the surface.

Future plans

Contaminated soil on the site has been removed, and the full remediation on site has been completed. As an Annex "R" site under the Inuvialuit Final Agreement, the land will be transferred to the Inuvialuit.

Johnson Point



Johnson Point

The Johnson Point site is an abandoned oil and gas exploration support and staging area located approximately 270 km northeast of Sachs Harbour on Banks Island, along the Prince of Wales Strait, in the Northwest Territories. The site was used by several exploration companies from the early 1960s until the early 1980s, when responsibility for the facilities reverted to the Crown. It continues to be used as a base for mineral exploration, a fuel cache location and an alternate airstrip for traveling farther north.

What are the concerns at the site?

Following a Phase I and II environmental site assessment, completed in October 2005, a number of issues were identified. These include the presence of hydrocarbon in soils, waste oil and other liquid wastes. Several buildings on the site were also found to contain asbestos, PCB and/or lead-based paints. General debris and waste metal that is scattered around the area could also pose a safety risk to people or wildlife.

Remediating the site

A detailed Phase I/II environmental site assessment was completed in October 2005, which included soil and water sampling, a geophysical survey of the site, and a complete site inventory.

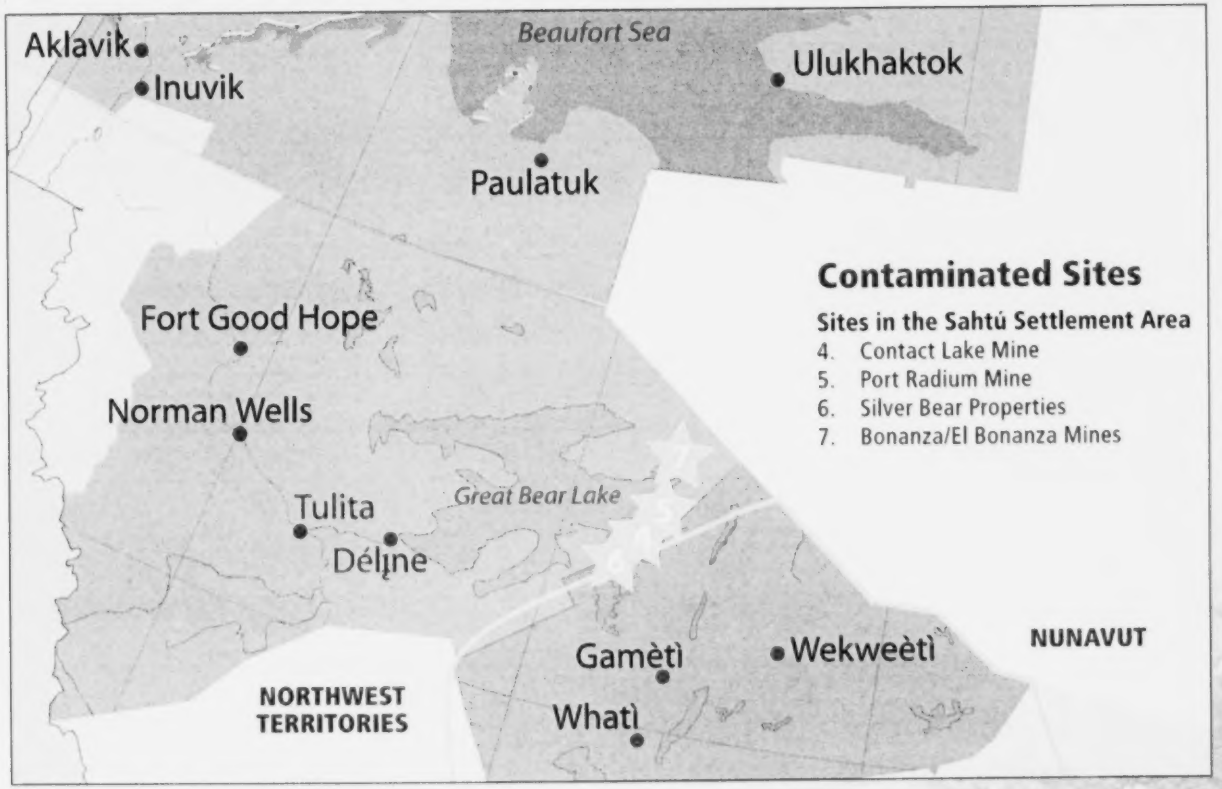
In 2006, activities included a traditional knowledge / community survey, community site visits, incineration of approximately 100,000L of waste fuel from 19 fuel storage tanks, and cleaning and crushing of waste barrels, which are now ready for removal. As well, a Phase III environmental assessment took place, which included a hazardous materials inventory, delineation of hydrocarbon-impacted soils, further geotechnical and geophysical surveys, and surface water and groundwater sampling.

Future plans

A remediation plan for the site will be developed in 2007, with extensive consultation with the Inuvialuit. Permits will be applied for and a detailed procurement strategy will also be developed.

Current timelines anticipate moving equipment to site in 2008 with the majority of the remediation work taking place in 2009, including demolition of the fuel tank farm, addressing the soil, and both non-hazardous and hazardous waste.

Sahtú Settlement Area



Sahtú Settlement Area

The *Sahtú Dene and Métis Land Claim Settlement Act* came into effect on June 23, 1994. The agreement provides the Sahtú Dene and Métis with title to 41,437 square km of land in the Northwest Territories, an area slightly larger than Vancouver Island. Subsurface rights are included on 1,813 square km of this land.

There are five communities in the Sahtú Settlement Area: Délı̨ne, Tulita, Norman Wells, Fort Good Hope, and Colville Lake. The traditional language of the Sahtú is North Slavey.

A number of contaminated sites have been identified and prioritized in the Sahtú region, and identification and assessment is ongoing.

Contaminated sites in the Sahtú identified for further investigation and potential remediation are located on both Sahtú and Crown Land.

Sahtú Sites

Assessment

Sawmill Bay

Remediation

Contact Lake Mine

El Bonanza/Bonanza Mines

Port Radium Mine

Silver Bear Properties

Contact Lake Mine

Contact Lake Mine

Contact Lake Mine is located on Contact Lake, approximately 265 km east of Dél̨ne and 300 km northwest of Yellowknife, approximately 12 km east of the abandoned El Bonanza and Bonanza mines. The site was originally a silver mine in the 1930s, then was mined for uranium from 1949 - 1950. The mine, owned by various companies, operated off and on until 1980 when it reverted to the Crown.

What are the concerns at the site?

During the mine's operation, an estimated 29,100 cubic metres of waste rock and 1,450 cubic metres of processed tailings were deposited downslope of the mine site towards Contact Lake. The tailings are located in a natural depression referred to as the tailings pond. Surface water runs downslope from the waste rock pile, through the tailings and collects in this pond. The tailings and surface mine water have elevated levels of metals. There are also a number of old buildings, mine structures and openings on the site that pose safety hazards.

Remediating the site

In 1993, an environmental assessment was conducted. The activities included an inventory of buildings, survey of waste deposits, sampling of tailing and waste rock, and collection of surface water and lake bottom sediments.

Between 2002 and 2005, a number of sampling programs and baseline studies took place, including the installation of groundwater monitoring wells to investiga*e groundwater quality and to determine if water is seeping from the tailings pond to Contact Lake. Warning signs were also posted at the site.

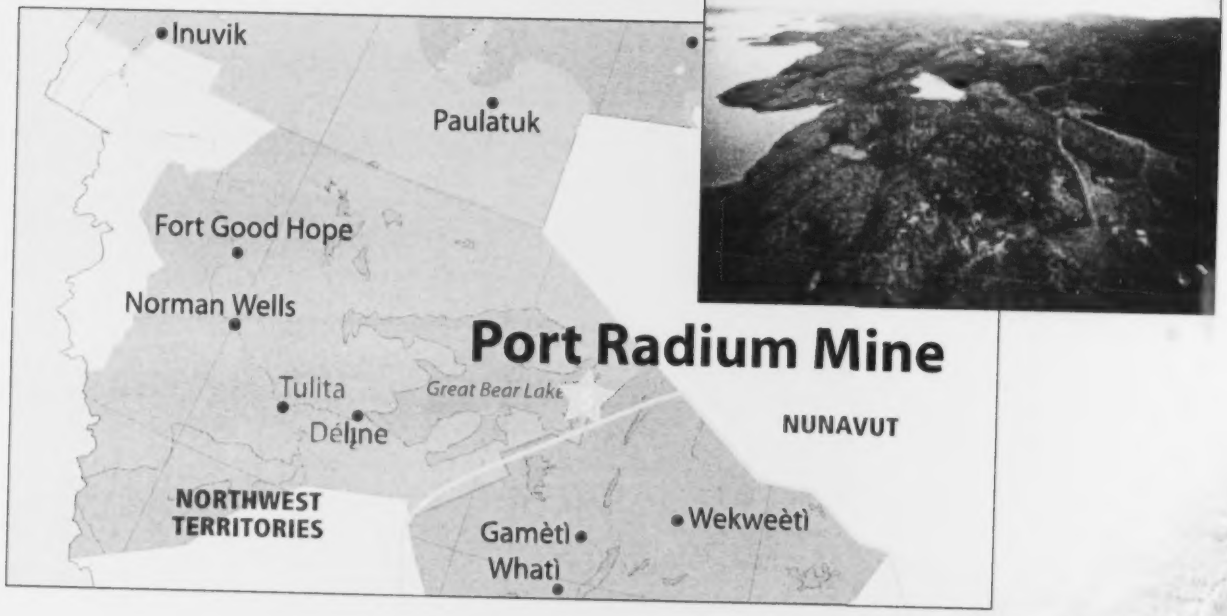
In 2006, a detailed site investigation was conducted on the site and vicinity which included water, soil and vegetation sampling, fish studies, analysis of hydrocarbons, assessment of mine openings and crown pillar stability and gamma radiation measurements.

Future plans

Activities on site planned for 2007/08 include disposal of explosives, obtaining required licenses and permits for remediation work, development of preferred remediation options in consultation with the community of Dél̨ne, continued assessments, water quality sampling and monitoring, and site tours.

Equipment and materials will likely be brought to site during the winter of 2008, at which time drums will be removed from site. Remediation work will include the sealing of mine openings, demolition of buildings and tanks, removal of hazardous materials, and covering of tailings as required.

Port Radium Mine



Port Radium Mine

Port Radium Mine is located on a peninsula along the eastern shore of Great Bear Lake in the Northwest Territories, 440 km north of Yellowknife and 265 km east of the Dene community of Déljne within the Sahtú Dene and Métis traditional lands. Beginning in 1932, the site was mined for radium used in medical research. From the early 1940s to the 1960s, the site was mined for uranium, used to make nuclear weapons and for nuclear power.

The site was mined for silver until 1982 when it was decommissioned. At that time, tailings were covered, mine openings were blocked, infrastructure was destroyed and all valuable equipment was removed.

The site has been reassessed and further studied since 2000, due to concerns raised by the community of Déljne. All studies and recommendations on how to address the site are done jointly by Canada and Déljne.

What are the concerns at the site?

As a result of over more than 40 years of mining, silver, copper and uranium are present in soils and surface water, localized to the immediate site. The site also has elevated gamma associated with the waste rock, and small amounts of hydrocarbons and asbestos residue.

Remediating the site

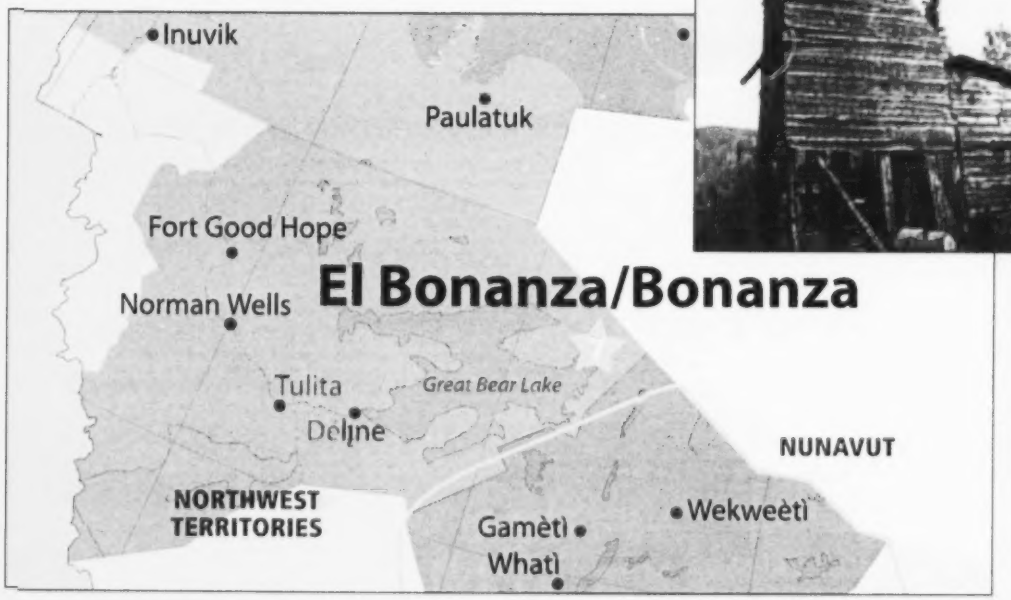
Studies carried out over the past five years were summarized in a Final Report on Action Plan Activities. Released in early September 2005, the report contained many recommendations, including those for the remediation of the site. The Port Radium Remediation Plan was compiled by the joint process and finalized in the fall of 2005, and a decision made to complete the remediation work during the 2007 summer season.

During 2006/07, the water quality and state of the environment monitoring program continued, a land use permit and Waste Nuclear Substance Licence were obtained, a capacity-building plan was developed, basic training took place with Déljne community members, and a contract was awarded for the remediation work.

Future plans

Site remediation is planned to start in the winter of 2007, including mobilization to Déljne on the winter road, and to site by barge in July. The majority of work will be carried out from July to September 2007, including sealing of mine openings, covering of areas of elevated radiation levels, the stabilization of tailings areas, demolition and hazardous waste disposal. Monitoring will begin at that time.

El Bonanza and Bonanza Mines



El Bonanza and Bonanza Mines

The former El Bonanza and Bonanza mines are located on the Dowdell Peninsula, about 430 km northwest of Yellowknife on the east coast of Great Bear Lake approximately 10 km southwest of Port Radium and 12 km west of the abandoned Contact Lake Mine. The site is within the boundaries of the Sahtú Settlement Area.

The original claims on the Bonanza Group were staked in 1931 for Eldorado Gold Mines Ltd, and further exploration led to the discovery of silver in two locations about 1 km apart. In 1934 the El Bonanza Mining Corporation Limited was created to mine the eastern silver deposit. Minor uranium showings resulted in expropriation of the property by the federal government from 1940 to 1950 for strategic purposes; however there was no mining activity at the site during this period. From 1965 to 1977 the property changed hands several times, and was mined for silver until it was leased to Echo Bay Mines Ltd. No activity is reported after 1984 when Echo Bay conducted further drilling and mapping and geological surveys.

What are the concerns at the site?

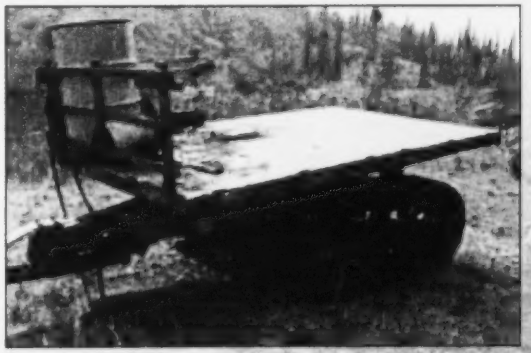
At the site, there are soils containing hydrocarbons, drums of mixed products, laboratory chemicals and waste rock. There are also a number of unsealed shafts and openings, as well as scrap metal and general debris.

Remediating the site

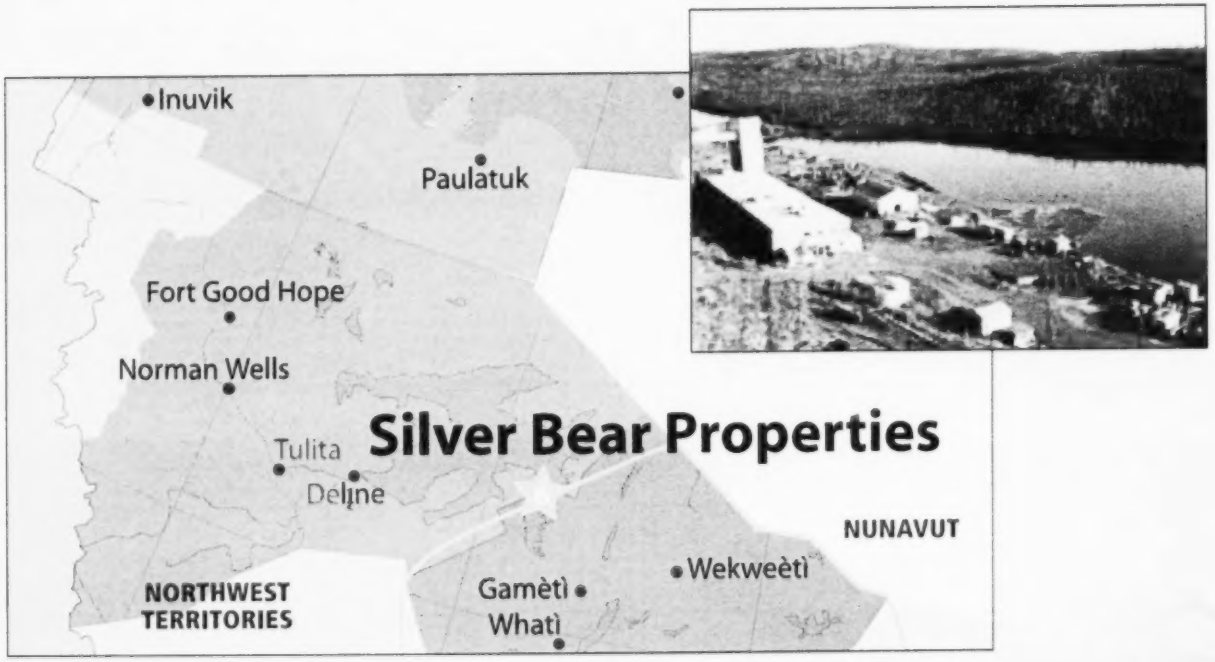
In 2006, a detailed site investigation was conducted on the site, including tests to determine the type and extent of metals and other compounds, detailed fish studies, a demolition assessment, vegetation studies, and a structural and opening assessment.

Future plans

In 2007/08 remediation options will be developed for the site and a preferred remediation plan will be created, in consultation with the community of Délîne. The remediation work will involve closure of mine openings, demolition of buildings and tanks, removal of hazardous materials, and other aspects as determined in the preferred remediation plan.



Silver Bear Properties



Silver Bear Properties

The Silver Bear Properties, in the Camsell River area, include Terra Mine and four satellite mines known as Northrim, Norex, Graham Vein and Smallwood. They produced primarily silver, copper and bismuth during the 1970s and early 1980s, until operations ceased in 1985. The sites are located approximately 300 km northwest of Yellowknife, near the southeast corner of Great Bear Lake. The closest Sahtú community is Déljne.

What are the concerns at the site?

Affected areas at the site are localized in two tailings ponds at the Silver Bear Properties, including HoHum Lake at Terra Mine and Hermandy Lake at Northrim. There are elevated levels of cadmium, lead, mercury, uranium, zinc and arsenic in the tailings areas and nearby soils. Hazardous waste, including laboratory chemicals and waste fuels are present on the site. There are also a number of unsealed mine openings.

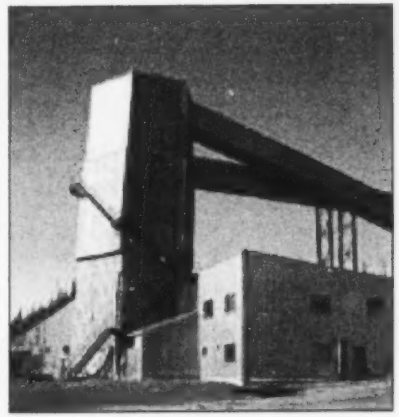
Remediating the site

The limited historical remediation work done on the properties includes the placement of leaking barrels of fuel and antifreeze into new containers at Terra Mine, and the removal of PCBs from the site in 2002. Detailed studies, conducted at the site since the early 1990s, were completed in 2005, and a final remediation plan is expected to be submitted to the Sahtu Land and Water Board by fall 2007 for approval. Once approved, it is expected to take several years to complete remediation work, followed by an appropriate monitoring program to assess the results of remediation work and determine the site status.

Future plans

In 2007, remediation options will be developed for the site, and a preferred remediation plan will be created in consultation with the communities of Déljne and Gamèti. Water quality monitoring will continue at the site.

The remediation work will include incineration of waste oils, removal of stored chemicals, closure of mine openings, construction of an onsite landfill, soil treatment, covering of waste rock and tailings, and other aspects as determined in the preferred remediation plan.



Wek'èezhìi Region

Wek'èezhìi Management Area

The Wek'èezhìi region is the management area of the Tłı̨chǫ settlement area, traditionally defined as the Mǫwhì Gogha De Nı̨ı̨tłèè area. The boundaries of the region are outlined in the Tłı̨chǫ Agreement, signed by the Government of Canada, the Government of the Northwest Territories and the Dogrib Treaty 11 Council on August 25, 2005 in Behchokǫ̀, NWT. It is the first ever combined land claim and self-government agreement in the Northwest Territories.

There are four communities in the Wek'èezhìi region: Gamètì, Wekweètı, Whatì, and Behchokǫ̀, where the Tłı̨chǫ Government is located. The traditional language of the Tłı̨chǫ people is Tłı̨chǫ (Dogrib).

A number of contaminated sites have been identified and prioritized in the Wek'èezhìi region, and identification and assessment is ongoing.

Contaminated sites in the Wek'èezhìi region that have been identified for further investigation and potential remediation are located on Crown Land.

Wek'èezhii Region Sites

Assessment

Spider Lake area

Remediation

Colomac Mine

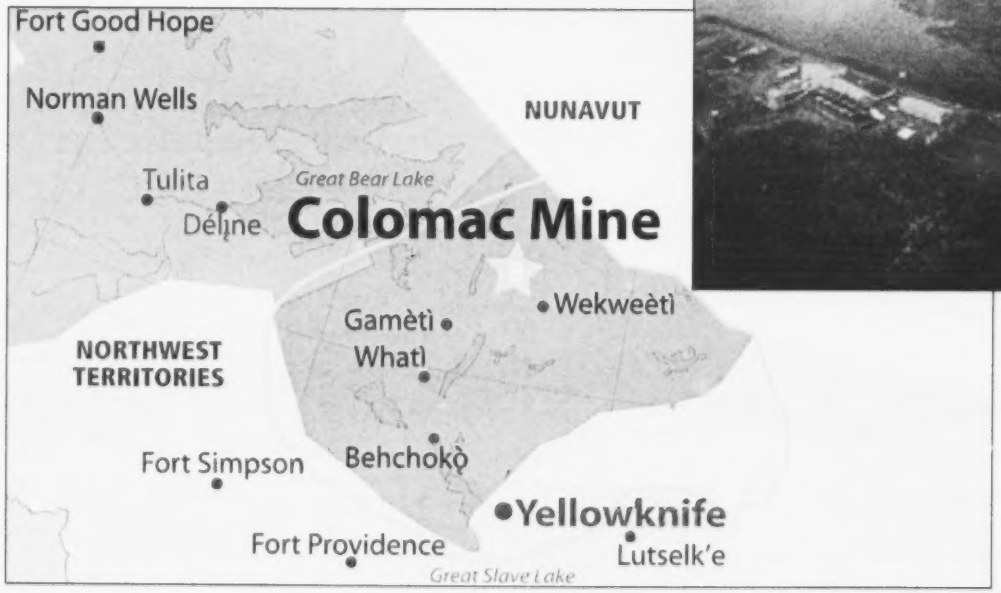
North Inca Mine

Indore/Beaverlodge Mines

Remediation Completed / Monitoring

Rayrock Mine

Colomac Mine



Colomac Mine

Colomac Mine was a gold mine in operation from 1989 to 1997, located 222 km northwest of Yellowknife. It is one of three mines that reverted to the Crown in 1999 when the mine's owner at the time, Royal Oak Mines Inc., went into receivership.

What are the concerns at the site?

One of the main concerns at Colomac is "tailings water" which contains, among other substances, cyanide – a chemical that was used to get the gold out of the ore.

Remediating the site

During the 2006/2007 season, the main remediation work on the site began, including the construction of a new dam, capping the exposed tailings and constructing an outlet channel for the treated water from Tailings Lake.

As well, a sediment sampling program along Steeves Lake shoreline was conducted, to determine if sediments have been impacted by hydrocarbon contamination.

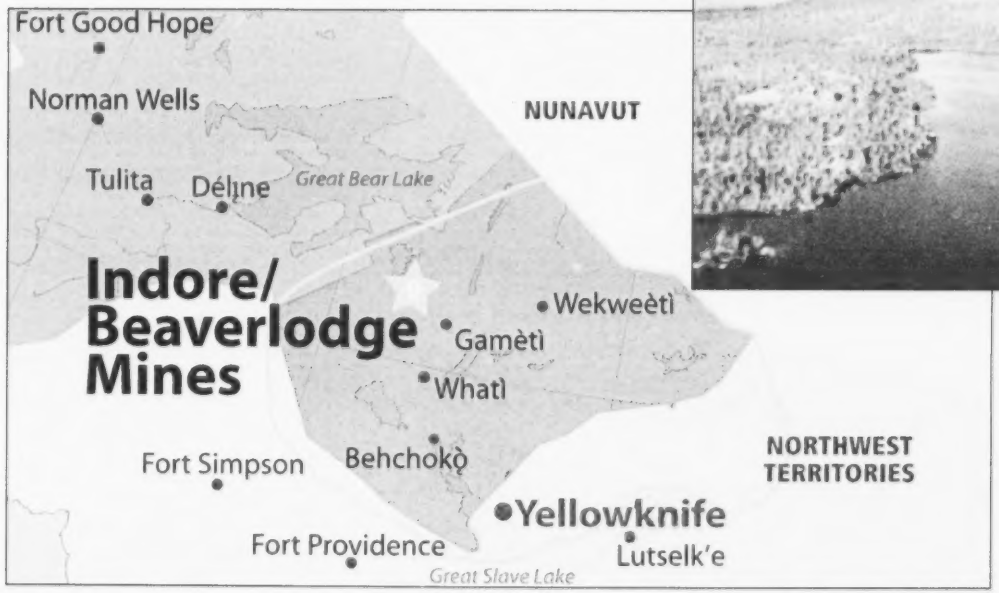
Other activities during the past season included site tours and community information sessions, waste oil recovery, operation of the Land Treatment Unit, and the continuation of aeration water treatment in the Zone 2 Pit.

Future plans

In addition to ongoing care and maintenance work by Tli Cho Logistics, remediation activities are continuing at the site, including quarries and pit berms remediation, Zone 2 Pit aeration, waste consolidation, warehouse demolition, Hewitt Lake cleanup, hazardous material removal, hydrocarbon remediation and monitoring.

It is anticipated that the cleanup of Colomac Mine will be completed in 2009, followed by ongoing monitoring at the site for a five-year period.

Indore/Beaverlodge Mines



Indore/Beaverlodge Mines

Indore Mine and Beaverlodge Mine are located 12 km apart on Hottah Lake, approximately 100 km north of Gamètì, in the Northwest Territories, in the Mǫwhì Gogha De Nı̨tłèè area of the Tłı̨chǫ land claim.

Indore Mine was originally staked for uranium exploration in 1950, and operated until the spring of 1953 when the mine was closed. The company changed names to Consolidated Indore Uranium Ltd. and continued development of the property until October 1953, when operations ceased due to lack of funds and failure to obtain a license. In 1955, activity resumed after another re-organization, under the name of United Uranium Corporation. The site was not profitable, and closed in 1956.

Beaverlodge Mine is a former uranium mine which had various owners between 1943 and 1957. The site was operated by Beta Gamma Mines Ltd. when it first reverted to the Crown in 1957. Over the following 20 years, exploration, further mining and fuel storage occurred at the site. The last company to stake the site before it reverted to the Crown once again in 1977 was Major Resources Limited.

What are the concerns at the site?

At Indore Mine, a small quantity of tailings remain on land, some suspected underwater tailings, slightly elevated radioactive waste rock and sediment, a former dump site, and miscellaneous debris and materials which may contain asbestos. There is also a mine opening and shaft, and the remains of former buildings.

At Beaverlodge Mine, the remediation will address shafts and pits, groundwater quality, radiation levels in waste rock near the pits, drums, burned remains of former buildings, and miscellaneous debris and scrap which may contain asbestos.

Remediating the site

No site remediation activities have occurred to date. During 2006/07, preliminary assessment work was conducted, and a site investigation plan developed. Some water and surface sampling has occurred as part of earlier site investigations.

Future plans

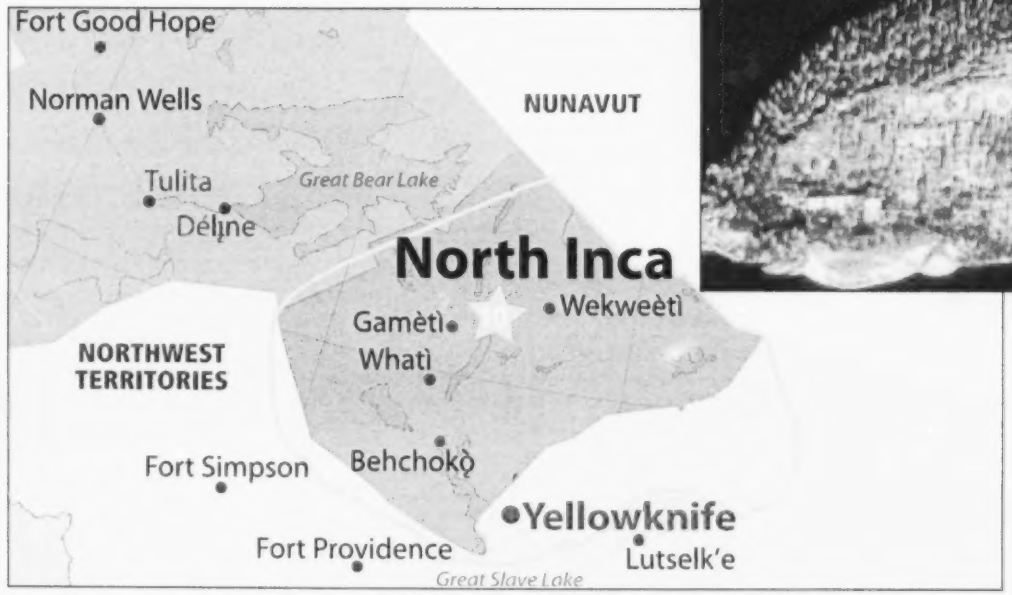
During 2007/08, site investigation programs will take place, including examination of water, soil and vegetation on site and vicinity water, studies of fish (and if appropriate, invertebrates), delineation of hydrocarbons, assessment of mine openings and crown pillar stability, assessment of potential borrow sources, gamma radiation measurements and radon monitoring as appropriate, and a detailed Site Specific Human Health and Ecological Risk Assessment.

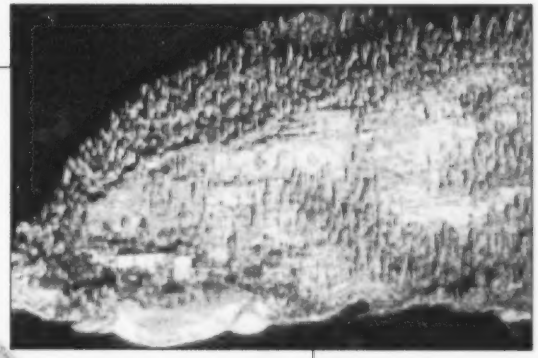
Using the site assessment data, and the results of the Site Specific Human Health and Ecological Risk Assessment, potential remediation options for the site remediation and risk management will be identified for review in 2007/08, in consultation with the Tłı̨chǫ Government and communities.

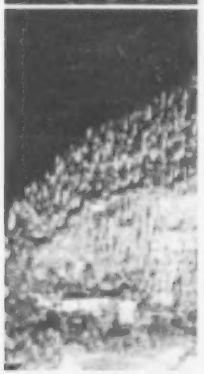
During 2009/10, winter road construction and mobilization will take place. Drums will also be removed and fuel incinerated, if required. Remediation work will also take place, including winter road construction and demobilization.

Monitoring may be ongoing, as determined in the remediation plan, to confirm remediation and to ensure occupational health and safety is addressed during site work. Long term monitoring will begin in 2010, once remediation activities are complete.

North Inca


Fort Good Hope
Norman Wells
NUNAVUT
Tulita
Great Bear Lake
Déline
North Inca
Wekweètì
Gamètì
Whatì
NORTHWEST TERRITORIES
Fort Simpson
Behchokǫ̀
Yellowknife
Fort Providence
Lutselk'e
Great Slave Lake





North Inca

The North Inca site is located in the Northwest Territories, approximately 190 km north of Yellowknife and 70 km east of Wekweètı, in the Mǫwhì Gogha De Nı̨ı̨tłèè area of the Tłı̨chǫ land claim. The site was a gold exploration property that operated between 1945 and 1949. On-site exploration activities included geological mapping, surface and underground drilling, including an exploration shaft. There has not been significant exploration activity on the site since 1949.

What are the concerns at the site?

The site contains a number of deteriorating buildings, two above ground fuel storage tanks, possible asbestos-containing materials, and unrestricted mine openings.

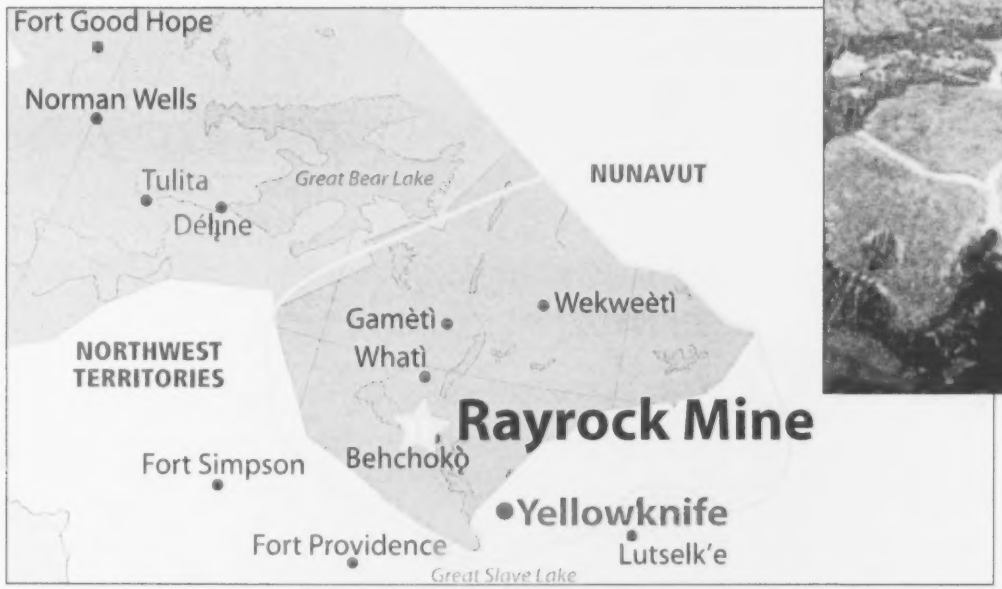
Remediating the site

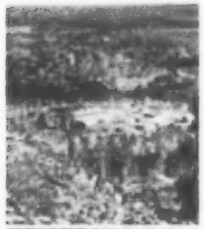
Detailed site investigations and remediation plan development will take place in 2007, with site remediation occurring in 2008 to coincide with the Colomac Remediation Project winter supply road.

Future plans

Full remediation of the site is expected to be complete by March 2009.

Rayrock Mine





Rayrock Mine

Rayrock Mine, located 145 km northwest of Yellowknife and 74 km northwest of Behchokǫ̀, was an underground uranium mine operated by Rayrock Mines Ltd. from 1957 to 1959.

What were the concerns at the site?

During operations at Rayrock Mine, approximately 70,000 tonnes of ore were processed, yielding 207 tonnes of uranium concentrate. Radioactive tailings were deposited on land and partly flowed into three small lakes. In 1959, two tailings basins contained 70,903 tonnes of radioactive tailings that had the potential to leach materials. The mine was also a potential source of radioactivity, through radon gas emissions from mine openings and ventilation shafts.

Remediating the site

The site was remediated in 1996 and 1997, following several site assessments. This work included sealing all mine openings and ventilation shafts, relocating radioactive material from the dump to the tailings piles and capping the tailings with a thick layer of silt-clay, followed by revegetation. Long-term monitoring at the site is ensuring that radiation exposure from the site remains at a minimum.

Future Plans

The site is undergoing long-term monitoring and is being monitored annually until 2009, then once every 10 years for a further 100 years. This may change if results warrant adjustments. Monitoring assesses the integrity of sealed mine openings, water quality and potential risks to humans.

To date, long-term monitoring results have shown that:

- Fish in the area are safe to eat
- Caribou sampled in the area are within the normal range of radionuclides for the NWT
- Very little risk remains to humans from radionuclide exposure
- Water quality in Sherman Lake meets drinking water standards
- Downstream water quality is not affected by the former mine
- Seals blocking the former mine openings are in good condition
- Alpha, Gamma and Beta Lakes are generally improving over time

Akaitcho Region

Akaitcho Region

There are four communities in the Akaitcho region: Fort Resolution, Lutsel K'e, Ndilo and Dettah. The City of Yellowknife is also situated within the traditional territory of the Akaitcho. Aboriginal languages spoken in the Akaitcho region include Dogrib, Chipewyan and South Slavey.

The Akaitcho Dene First Nations are currently negotiating a land and self-government agreement, with both the Government of Canada and the Government of the Northwest Territories. An interim land withdrawal and agreement-in-principle are currently being finalized, and will provide guidance for the remediation of contaminated sites in the Akaitcho region until a final Akaitcho agreement is negotiated.

A number of contaminated sites have been identified and prioritized in the Akaitcho region, and identification and assessment is ongoing.

Akaitcho Sites

Assessment

Hidden Lake Mine
Ruth Gold Mine
Bullmoose Mine

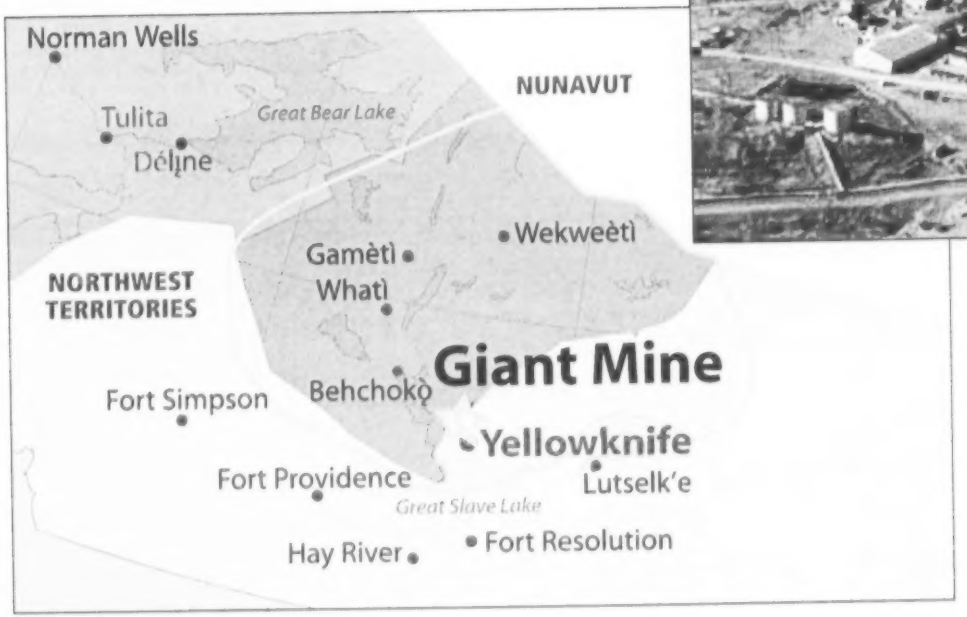
Remediation

Giant Mine
Tundra Mine

Remediation Completed / Monitoring

Discovery Mine

Giant Mine


Norman Wells
NUNAVUT
Tulita
Great Bear Lake
Déline
Wekweètì
Gamètì
Whatì
NORTHWEST TERRITORIES
Giant Mine
Behchokǫ̀
Fort Simpson
Yellowknife
Fort Providence
Lutselk'e
Great Slave Lake
Hay River
Fort Resolution

Giant Mine

Giant Mine began operations in 1948 and quickly became one of Canada's most prolific gold mines. Over its lifespan, Giant Mine produced more than 7 million ounces of gold and played a significant role in the economic growth of Yellowknife. It is one of three mines that reverted to the Crown in 1999 after the mine's owner at the time, Royal Oak Mines Inc., went into receivership.

What are the concerns at the site?

The main issue at Giant Mine is the 237,000 tonnes of toxic arsenic trioxide dust stored underground at the site. This is equivalent to the volume of seven and half 11-storey office buildings. The dust is a by-product of the gold production process, when the mined ore was roasted to release the gold. On the surface level there are also tailings ponds, contaminated soils, old mine structures and other buildings that require remediation.

Remediating the site

The Government of Canada and the Government of the Northwest Territories signed a cooperation agreement in March 2005. Both parties worked together to develop a remediation plan that addresses the cleanup of the entire mine site, including the long-term storage and containment of the underground arsenic trioxide dust, and the demolition or removal of all buildings and surface facilities. The finalized Remediation Plan was screened by an Independent Peer Review Panel and will be submitted to the Mackenzie Valley Land and Water Board as part of a water license application in 2007 for regulatory review under the *Mackenzie Valley Resource Management Act*.

Future Plans

Future plans are to implement the Remediation Plan as soon as approvals are received.

The arsenic trioxide dust that is safely stored underground in chambers behind concrete bulkheads is regularly monitored. Under the Remediation Plan these underground chambers and surrounding areas will be frozen using a freeze plant and thermosyphons to extract the heat from the ground, to mimic the pre-existing natural permafrost conditions.

Until then, regular care and maintenance activities will ensure the continued protection of human health and the environment. Care and maintenance work at Giant Mine includes maintaining the mine in an environmentally-compliant state by pumping and treating contaminated mine water.

Tundra Mine

Norman Wells
NUNAVUT
Tulita
Great Bear Lake
Déline
Wekweètì
Gamètì
NORTHWEST TERRITORIES
Whatì
Tundra Mine
Fort Simpson
Behchokǫ̀
Yellowknife
Fort Providence
Łutselk'e
Great Slave Lake
Hay River
Fort Resolution

Tundra Mine

Tundra Mine is a former gold mine located 240 kilometres northeast of Yellowknife. The site is located within the Akaitcho Treaty Eight Claim, the Wek'èezhìi Management Area identified in the Tłı̨chǫ Land Claims and Self Government Agreement, and the traditional lands identified by the North Slave Métis Alliance.

What are the concerns at the site?

Royal Oak used the site to process ore and to dispose of tailings from nearby Salmita Mine (remediated in the late 1980s). The main concerns are arsenic and metals, the majority of which are contained within the 62.4 hectares Tailings Containment Area (TCA). The water in the TCA has elevated levels of aluminium, arsenic, chromium, manganese, copper, iron and lead. Water downstream from the TCA is affected.

Remediating the site

Tundra Mine has been in care and maintenance mode since 1999. Activities carried out have included dam repairs, geotechnical inspections, securing buildings, removal of hazardous lab wastes, posting signs and baseline monitoring studies.

During 2006/07, additional site assessments were conducted, such as water quality sampling and geotechnical assessments. Consultations with First Nations took place to review potential remediation options for the site, and to finalize the remediation plan. The composition of hazardous material in buildings was analyzed and amounts of demolition debris determined. Tailings water was further studied, and a finalized treatment plan developed. The remediation plan was submitted to the Mackenzie Valley Land and Water Board for necessary permits and approvals.

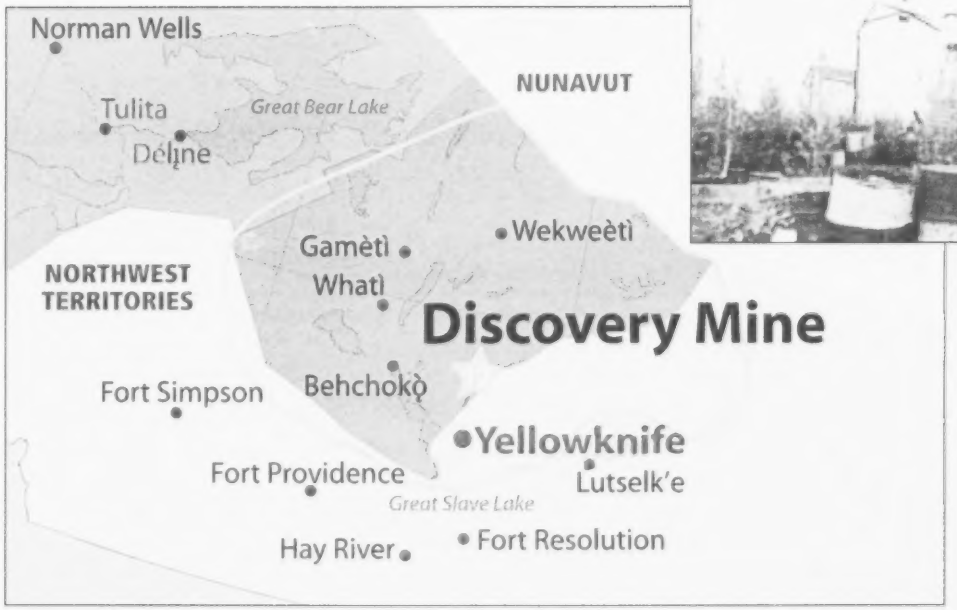
Future plans

In 2007/08, buildings will be demolished, mine openings closed, and waste will be disposed of in a landfill onsite. Proposed cover designs will be tested, and the remedial plans for covering tailings finalized. As well, the remediation plan for water treatment and tailings covers will be completed.

During 2008/09, water in the TCA will be treated, tailings will be covered, soils will be covered, and dams decommissioned. Long-term monitoring will begin during this time.

It is expected that remediation will take three years to complete, followed by five years of site monitoring.

Discovery Mine



Discovery Mine

Discovery Mine was an abandoned gold mine located on the west shore of Giauque Lake, approximately 80 km northeast of Yellowknife. Owned by Discovery Mines Ltd., it operated from 1949 to 1969 and at that time was one of the most profitable gold mines in the country.

What were the concerns at the site?

At closure, approximately 1.1 million tonnes of acid-generating tailings that also contain mercury, had been spread over 32 hectares of land and 3.7 hectares of lake sediment above the low water level. There was also asbestos, lead-based paint, old buildings, mine structures, unsealed mine openings and soils containing hydrocarbons on site that posed health and/or safety risks.

Remediating the site

The initial remediation work occurred between 1998 and 2000 and involved the capping of the tailings using a low permeability clay cover and waste rock as well as some general clean-up of the site.

The remaining work was assessed and described in the 2004 Discovery Mine Remediation Plan, which then went through regulatory approvals and procurement processes. The primary goal of the remediation plan was to return the site to a safe condition for hunting, trapping, and fishing, and for the protection of wildlife and the environment.

During the summer of 2005, the remaining exposed tailings were excavated, mine openings were sealed, hazardous materials were collected and consolidated, affected soils were excavated, buildings were demolished, and the tailings cap was repaired. The former borrow pit was also stabilized and the pit water was treated and discharged. An engineered landfill was constructed onsite to dispose of the majority of the waste. Once the winter road was constructed, hazardous materials were disposed of offsite, and the Bluefish to Discovery power line was also decommissioned.

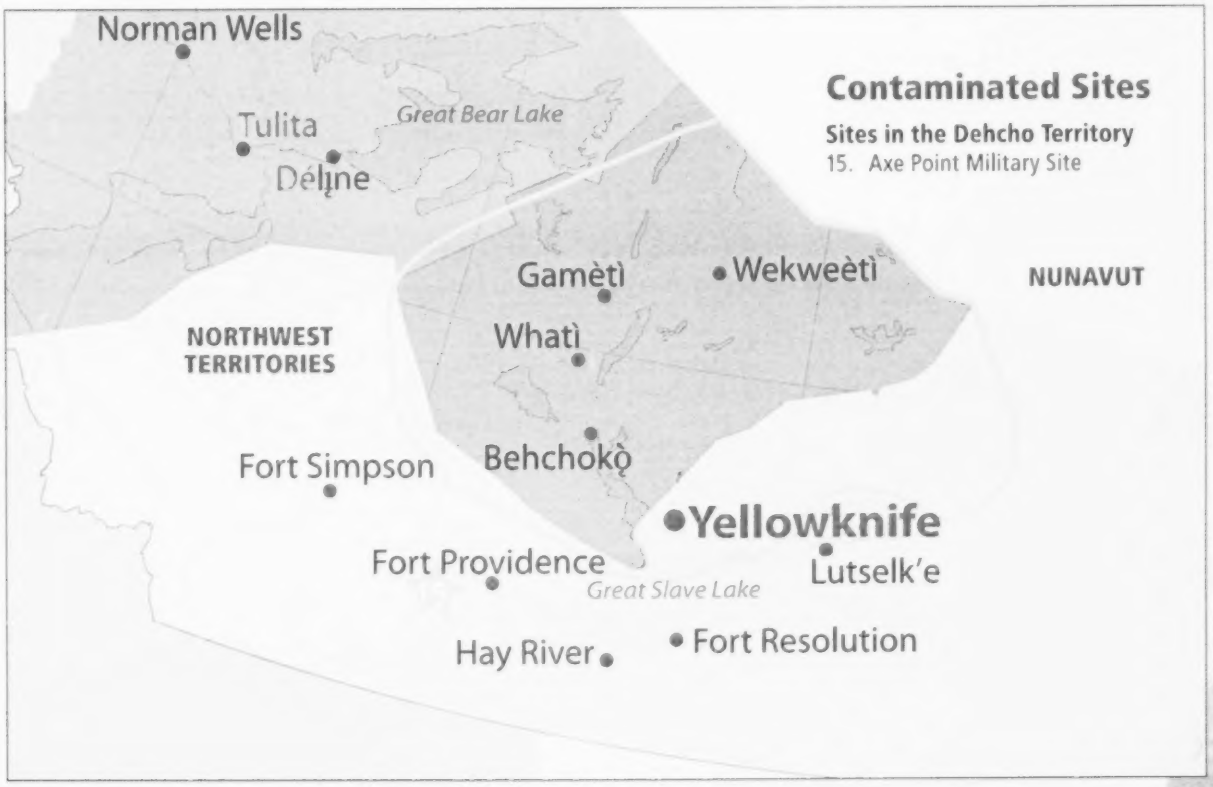
Throughout the assessment, remediation planning and implementation stage, the Tłı̨chǫ and the Yellowknives Dene First Nations have been involved in the project. This included evaluating remedial options, taking site tours and providing input into reports and work plans.

Future plans

Remaining work at the site consists of managing the water in the borrow pit on the site until the pit has stabilized, and an outflow structure is constructed; this will allow water in the pit to overflow naturally.

A long-term monitoring plan will be developed through consultation with communities. Monitoring will be conducted on an annual basis for at least five years, including annual meetings with First Nations representatives. At the end of this period, INAC will analyze the results and provide recommendations to the MVLWB and the First Nations on the type and frequency of future required monitoring.

Dehcho Territory



Dehcho Territory

The Dehcho traditional territory is located in the southwest corner of the Northwest Territories. The Dehcho First Nations are currently in a process with the federal and territorial governments to determine a land, resource and governance agreement. Until that time, the Dehcho First Nations Interim Measures Agreement provides temporary measures that apply in the Dehcho territory while the parties are negotiating a final agreement.

There are 11 communities in the Dehcho: Fort Liard, Fort Providence, Fort Simpson, Hay River Reserve, West Point, Wrigley, Kakisa, West Point, Jean Marie River, Trout Lake and Nahanni Butte. The town of Hay River is also situated within the Dehcho traditional territory. The traditional language of the Dehcho is South Slavey (Dehcho Dene language).

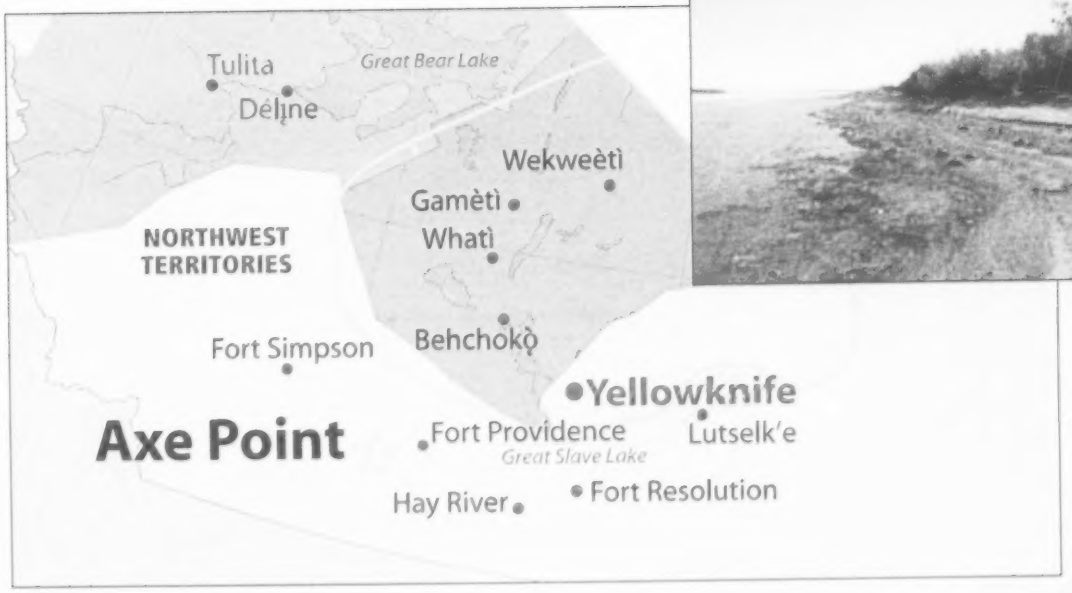
A number of contaminated sites have been identified and prioritized in the Dehcho region, and identification and assessment is ongoing.

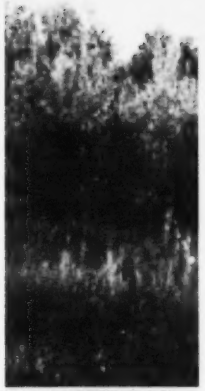
Dehcho Sites

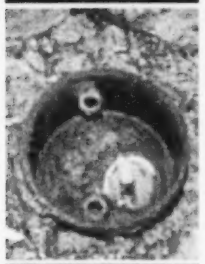
Remediation

Axe Point Military Site

Axe Point Military Site







Axe Point Military Site

Axe Point is located on the Mackenzie River, 60 km west of Fort Providence, in the Dehcho traditional territory in the Northwest Territories. The site was an airstrip, staging area and camp along the winter road to Norman Wells for the American military during World War II. The site supported the construction of the CANOL Project, an oil pipeline between Norman Wells and Whitehorse. The site was in operation for several years.

What are the concerns at the site?

Investigations have found elevated levels of hydrocarbons and metals in soils and groundwater on site. Geophysical surveys have identified buried materials onsite. There are seven collapsed buildings, metal debris, a boiler, heavy equipment and old batteries at the location. There are elevated levels of arsenic, lead and uranium in some soil at the site, as well as iron, manganese, cadmium and selenium.

Remediating the site

In 2001, a general site assessment was done, which included water testing, assessing old buildings, and gathering information about contaminants on site. In 2003, more water quality testing was done, including a detailed study of possible impacts on the nearby Mackenzie River. This work was done in cooperation with the Fort Providence Resource Management Board. A traditional knowledge study was also completed to gather data on the historical and traditional uses of the site.

In 2005, an additional environmental investigation was conducted that also incorporated traditional knowledge, to look at soil and groundwater quality. A hydrogeology study was conducted in 2006. The Remediation Plan for the site was finalized in January 2007, and has been submitted to the Mackenzie Valley Land and Water Board for regulatory approval.

Future plans

In 2007, planned activities include regulatory approval of the remediation strategy, site visits, community meetings and consultation, brushing of trails used for monitoring, removal of surface and hazardous debris from the site, filling in and grading cellars, and ongoing water quality monitoring.

It is expected to take one summer season to remediate the site. All remedial activities are expected to be completed in 2007.

What is Found at NWT Contaminated Sites?

A variety of substances and hazards are found at contaminated sites in the NWT. Some substances are naturally occurring but have become a problem due to development, while others were brought into the area for a specific purpose. Below is information about some significant contaminants and hazards found at contaminated sites in the NWT.

Acid-generating waste rock and tailings: Also commonly referred to as acid rock drainage. During mining, rock is disturbed and minerals that were contained in the rock are exposed to oxygen and the environment. If the rocks are naturally acidic, this can lead to the creation of an acidic environment which can be transported by water.

Ammonia: Commonly found at mine sites where cyanide is used. Ammonia occurs when cyanide breaks down (degrading), and is found in tailings and tailings water. Ammonia is also used in explosives.

Arsenic trioxide: Rock mined in Yellowknife and some other gold deposits in the NWT is rich in arsenopyrite, a mineral that has a high arsenic content. The ore in this area was roasted to release the gold. When it was roasted, arsenic was also released as a gas. The gas cooled and became arsenic trioxide dust.

Cyanide: Chemical added during the floatation process to separate gold from ore. Cyanide is brought to the site as a powder. After it is used in the floatation process, it ends up in tailings and tailings water.

DDT: Commonly used pesticide at sites in the past to help workers deal with mosquitoes. It was brought to the site in barrels, and was used liberally.

Hazardous waste: Other potentially harmful substances brought to the sites, used in ongoing operations. For example, several sites had on-site assay laboratories, which involved lab chemicals. Antifreeze and asbestos were also common on sites.

Hydrocarbons: All petroleum-based products, such as fuels, oil and grease. It is used at sites for heating, power generation and vehicles. If these products are not handled or stored properly, there can be leaks and spills, which contaminate soil and water.

Lead: Substance found in paint, batteries and hydrocarbons use, such as leaded fuels.

Mercury: Substance added during the floatation process to separate gold from ore. Mercury is brought in as a liquid. Once used, it remains a liquid and can be found in tailings and tailings water.

PCBs: Oily substance brought to sites for use as a coolant in electrical equipment. PCBs were also mixed with paint used as a moisture barrier. If these products are not disposed of properly, they can cause contamination of soils, air and water, and bioaccumulation in mammals.

Physical hazards: Physical facilities required for ongoing operation of sites, such as buildings, air strips and mine workings which have decayed over time and become safety risks.

Uranium-related waste: Waste rock and other material left over from the mining process. Uranium naturally gives off radiation as part of the ongoing decaying process. When uranium is mined, it is exposed to oxygen and that decaying process is accelerated. Uranium-related waste is put in tailings containment areas, resulting in a higher concentration and higher than natural radiation levels.

Other Useful Terms

Contaminant: Any physical, chemical, biological or radiological substance in the air, soil or water that has an adverse effect. Any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.

Contaminated Site: A site at which substances occur in amounts above what would be natural and pose, or likely will pose, a hazard to human health or the environment, or exceed levels specified in policies and regulations.

Reclamation: The process of reconverting disturbed land to its former state or other productive uses.

Remediation: The removal, reduction, or neutralization of substances, wastes or hazardous material from a site so as to prevent or minimize any adverse effects on the environment or public safety.

For More Information

For more details on any of the contaminated sites mentioned in this book or any other related questions, please contact:

Contaminants and Remediation Directorate (CARD) office

Indian and Northern Affairs Canada
NWT Region
P.O. Box 1500
Yellowknife, NT X1A 2R3
Phone: (867) 669-2416
Email: ntcard@inac-ainc.gc.ca
Web: http:/www.ainc-inac.gc.ca/cd_e.html

Some helpful websites:

NWT Regional website
http://nwt-tno.inac-ainc.gc.ca

Giant Mine Remediation Project
http://www.giant.gc.ca

INAC Mine Site Reclamation Policy for the Northwest Territories
http://www.ainc-inac.gc.ca/ps/nap/recpolnwt/index_e.html

INAC Northern Contaminated Sites Program
http://www.ainc-inac.gc.ca/ps/nap/consit/index_e.html

INAC Youthbuzz website
http://nwt-tno.inac-ainc.gc.ca/youthbuzz